Lesson 9-2 Sample Proportions

# Sample Proportions

http://ebooks.bfwpub.com/tps3e/eq/ch09_eqn582-01.jpgChoose an SRS of size n from a large population with population proportion *p* having some characteristic of interest. Let *ê* be the proportion of the sample having that characteristic.

How good is the statistic *http://ebooks.bfwpub.com/tps3e/eq/phat.gif*as an estimate of the parameter *p*? To find out, we ask, “What would happen if we took many samples?” The ***sampling distribution of http://ebooks.bfwpub.com/tps3e/eq/phat.gif***answers this question. How do we determine the center, shape, and spread of the sampling distribution of *http://ebooks.bfwpub.com/tps3e/eq/phat.gif*? By making an important connection between proportions and counts. We want to estimate the proportion of “successes” in the population. We take an SRS from the population of interest. Our estimator is http://ebooks.bfwpub.com/tps3e/eq/phat.gif . Since values of *X* and *http://ebooks.bfwpub.com/tps3e/eq/phat.gif*will vary in repeated samples, both *X* and *http://ebooks.bfwpub.com/tps3e/eq/phat.gif*are random variables. Provided that the population is much larger than the sample (say at least 10 times), the count *X* will follow a binomial distribution. **The proportion *http://ebooks.bfwpub.com/tps3e/eq/phat.gif*does not have a binomial distribution.**

The sampling distribution of *ê* is **approximately normal** and is closer to a normal distribution when the sample size *n* is large.

The **mean** of the sampling distribution is exactly p.



The **standard deviation** of the sampling distribution is

# Rule of Thumb 1 (for standard deviation)

Use the formula for the standard deviation of *ê* only when the population is at least 10 times as large as the sample.

# Rule of Thumb 2 (for normality)

We will use a normal approximation to the sampling distribution of *ê* for values of n and p that satisfy *np* ≥ 10 and *n*(1 *- p*) ≥ 10.

# What Can Go Wrong?

Make sure you check the rules of thumb before you use the normal distribution.